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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/519,073

Filing Date: December 23, 2004

Appellant(s): FUKUI ET AL

Ronald Kubovcik
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/13/2008 appealing from the Office action
mailed 12/28/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP 2000-013088	Nobufumi	01-2000
4927514	Solomon	05-1990

5468571

Fujimoto

11-1995

The glass transition point and melting point of polytetrafluoroethylene, (retrieved from the Internet www.scientificpolymer.com/catalog/description.asp?QproductCode=203 on 3/23/2007)

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 2-8, 11, 13-15, 20-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4,

6-9, 12, 19, 21, 24, 41, and 75-77 of copending Application No. 10/363039. Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 2-8, 11, 13-15, 20-22 of the instant application is anticipated by copending application claims 1-4, 6-9, 12, 19, 21, 24, 41, and 75-77 in that claims 1-4, 6-9, 12, 19, 21, 24, 41, and 75-77 of the copending application contains all the limitations of claim of the instant application. Claim 2-8, 11, 13-15, 20-22 of the instant application therefore is not patentably distinct from the copending claim and as such is unpatentable for obvious-type double patenting. Although the copending claims do not expressly recite the mechanical properties of a current collector and a binder as claimed in the instant application, it is deemed to have been met by a process in which a surface roughened copper foil current collector and the binder are sintered below the decomposition temperature and above the glass transition temperature of the binder as recited in the copending claim 1.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 2-8, 11, 13-15, 20-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3, 4, 6-9, 12, 19, 21, 24, 41, and 75-77 of copending Application No. 10/673348. Although the conflicting claims are not identical, they are not patentably distinct from each other. Claims 2-8, 11, 13-15, 20-22 of the instant application is anticipated by copending application claims 3, 4, 6-9, 12, 19, 21, 24, 41, and 75-77 in that claim 3, 4, 6-9, 12, 19,

21, 24, 41, and 75-77 of the copending application contains all the limitations of claim of the instant application. The mechanical properties recited in the instant claim 2 are deemed to have been met by a process in which a surface roughened copper foil current collector and the binder are sintered below the decomposition temperature and above the melting temperature of the binder as recited in the copending claims. Claim 2-8, 11, 13-15, 20-22 of the instant application therefore is not patentably distinct from the copending claim and as such is unpatentable for obvious-type double patenting.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims Analysis

The limitation “the current collector is subject to heat treatment before the active material layer is provided on the surface of the current collector” was considered, but was not given patentable weight because the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

Applicant argues that heat treatment of a metallic foil can cause structural changes. However, the Examiner notes that the heat treatment of the current collector prior to providing the active material layer is solely for the purposes of analyzing the properties of the current collector without the presence of the active material layer. The Specification pg 5 line 23 states that “[i]t is difficult to measure mechanical properties of the current collector after the sintering treatment, because it then carries the active material layer thereon to constitute the negative electrode. Instead, the current collector

before the sintering treatment can be separately subjected to the same heat treatment as the sintering treatment and then measured to determine such mechanical properties."

The Examiner acknowledges that sintering imparts structural changes. However, the process in which "the current collector is subject to heat treatment before the active material layer is provided on the surface of the current collector" is not part of the manufacturing process. It is an analytical technique to measure the mechanical properties of the current collector.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-8, 13-15, 20-22 are rejected under 35 U.S.C. 103(a) as obvious over Nobufumi (JP 2000-012088) in view of Solomon (US 4927514) and Fujimoto ((S 5468571), as evidenced by the glass transition point and melting point of polytetrafluoroethylene, (retrieved from the Internet www.scientificpolymer.com/catalog/description.asp?QproductCode=203 on 3/23/2007).

Nobufumi discloses a negative electrode and a rechargeable lithium battery comprising a mixture of silicon-containing anode material, carbon material, and a binder. The mixture is prepared and a base material made of a foil or mesh of conductive metal is coated with the mixture to form a coated film. The coated film is

sintered in a non-oxidizing atmosphere, thereby integrating a sintered material of the coated film with the base material. Nobufumi discloses that the base material is a electrolytic copper foil. The rechargeable lithium battery includes a positive electrode material and a nonaqueous electrolyte. The particle size of the silicon-containing compounds is from 0.01 um to 100 um. (See abstract, [0005, 0007, 0011, 0020, 0032-39, 0058-0061]) Nobufumi discloses that the conductive metal foil thickness is between 3 and 100 um. The current collector has a roughness of 0.03 to 1 um. Nobufumi discloses that the thickness of the anode active material is between 10-1000 um and depends on the magnitude of the cell [0040]. Further, the binder used is polyvinylidene fluoride. The glass transition temperature is 30 C and the melting temperature is 158 C (see reference attached).

In Example 28, the surface roughness of the current collector is 1 um [0066]. The thickness of the active material and current collector are the same as that of Example 1. The thickness of the active material is 30 um. The thickness of the current collector is 20 um [0061]. Nobufumi meets the range $5Y \geq X$ and $250Ra \geq X$ as claimed by the applicants in which X is the thickness of the active material layer, Y is the thickness of the current collector, and Ra is the surface roughness of the current collector.

Nobufumi teaches that the binder is a polyvinylidene fluoride and does not teach that the binder is a polyimide (claim 2). However, Fujimoto teaches of a negative electrode with a binder comprising polyimides (2:10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute

Nobufumi's polyvinylidene fluoride for Fujimoto's polyimide because PVDF and polyimide are art recognized equivalents as a binder material. See MPEP 2144.06.

Fujimoto uses a polyimide Upilex (4:17). Applicant provided in the Response (dated 10/9/2007) that the mechanical properties of Upilex correspond closely to those of binders α 1 and β 1 in the experiments in the present application (pg 12 of Response). It has been held by the courts that where the claimed and prior art products are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Nobufumi modified by Fujimoto does not disclose sintering at a temperature higher than a glass transition temperature of the binder and lower than the decomposition temperature of the binder (claim 2). Nobufumi does not disclose the mechanical properties as claimed in claim 2. However, Solomon teaches an electrode in which an active material mixture is deposited onto the support layer (4:65-5:20). The resulting layer is then sintered to provide an electrode structure consisting of a support layer and an active layer. Typically, this sintering is conducted at a temperature sufficiently low to not cause any deleterious polymer decomposition, e.g., when PTFE is present in both the support layer and the active layer, heating can be at a temperature within the range of from about 280 C to 350 C. Generally, sintering temperatures will not exceed above about 350 C. The Examiner notes that the glass transition temperature for PTFE is 130 C and the melting temperature for PTFE is 327 C (see attached). It would have been obvious to one of ordinary skill in the art at the time the

invention was made to sinter the negative electrode of Nobufumi modified by Fujimoto, as taught by Solomon, in a temperature range that does not cause deleterious polymer decomposition, such as above the glass transition temperature but below the decomposition temperature. Because it is commonly known in the art that the polymer chains possess mobility on a microscopic level above its glass transition temperature, one would be motivated to sinter above the glass transition temperature for the benefit of diffusing the binder material into the active material for adhesion purposes.

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a known process to a similar product to achieve predictable results. The process of Solomon would have been predictable to Nobufumi's electrode because the temperature range that does not cause deleterious polymer decomposition would allow the binder to still be present in the electrode.

The mechanical properties recited in claim 2 for the current collector are deemed to have been met by a process in which a surface roughened copper foil current collector and the binder are sintered below the decomposition temperature and above the melting temperature of the binder.

(10) Response to Argument

Applicant argues that a person of ordinary artisan would not be motivated to apply the teachings of Solomon relating to a platinum black air cathode to the negative electrode of the lithium secondary battery of Nobufumi because the properties desired

of the platinum black air cathode for an electrolytic cell are not the same properties required for the negative electrode for a nonaqueous secondary battery of Nobufumi. Applicant argues that the Examiner has not explained why decomposition of the binder in the negative electrode of Nobufumi is necessarily deleterious or undesired. Pg 5 of the Appeal Brief.

The Examiner notes that although a platinum black air cathode may have different properties than a negative electrode of Nobufumi, it is noted that regardless of the type of electrode, a decomposition of the binder is undesired because the binder binds the active material of the electrode together. A decomposition of a binder in an electrode would defeat the purpose of adding a binder to the electrode.

Applicant argues that the Examiner has cited nothing to support a position that all polyimide binders and all current collectors will possess such properties when heated for 0.5 to 10 minutes the sintering time taught in Solomon. Applicant argues that in the examples in their specification, heat treatment times are on the order of tens of hours and that Nobufumi lists copper, nickel, titanium and stainless steel as the "metallic foil charge collector." Pg 6 of the Appeal Brief.

As stated above in the rejection, Fujimoto uses a polyimide Upilex (4:17). Applicant provided in the Response (dated 10/9/2007) that the mechanical properties of Upilex correspond closely to those of binders $\alpha 1$ and $\beta 1$ in the experiments in the present application (pg 12 of Response). It has been held by the courts that where the

claimed and prior art products are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Regarding the sintering time, it is the examiner's position that the electrode of the prior art is only slightly different than the electrode prepared by the method of the instant Application. The burden has been shifted to the applicant to show how the difference in the sintering time does not read on the Applicant's instant claims. See MPEP 2113.

Although Nobufumi's charge collectors are not limited to electrolytic copper foil, it is noted that Nobufumi lists a small list of charge collectors that discloses electrolytic copper foil as one of the charge collectors.

*Applicant argues the unexpected superior charge-discharge cycle characteristics. Applicant argues that the criticalness of the mechanical properties of the current collector and of the binder of the active material layer of the negative electrode of the present invention demonstrates the non-obviousness of the negative electrode of the present invention and rebuts any *prima facie* obviousness alleged to be supported by the cited prior art. Pg 7 of the Appeal Brief.*

It is noted that the Applicant is not arguing the non-obviousness of the combination of prior art, but the non-obviousness of the mechanical properties. It is the Examiner's position that it is an inherent property existing the combination of references.

Applicant argues that the claimed invention does not exist in the combination of prior art. Pg. 8 of the Appeal Brief.

The Examiner respectfully disagrees. It is the Examiner's position that it is an inherent property existing the combination of references.

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Cynthia Lee/

Cynthia Lee

Examiner, Art Unit 1795

Conferees:

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

/William Krynski/

Quality Assurance Specialist, TC 1700

Appendix A: the glass transition point of poly(tetrafluoroethylene)